

**Creating a Tribal Source and Emission
Inventory Out of Thin Air:
A Comprehensive Approach
Using Primary and Secondary Data**

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PURPOSE



- A document for decision-making
 - ✓ Planning the air program
 - ✓ Planning for development on the reservation

APPROACH



NARROW THE FOCUS:

- Regional data
- Local information
- Specifics for your reservation

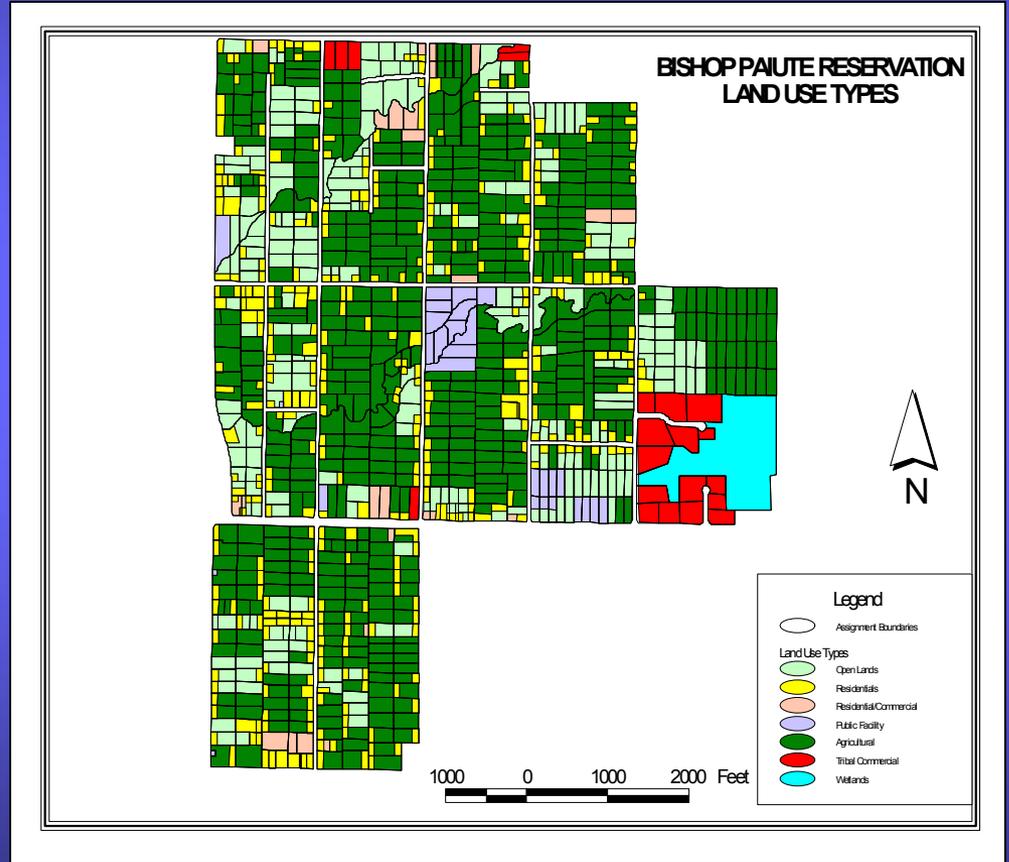
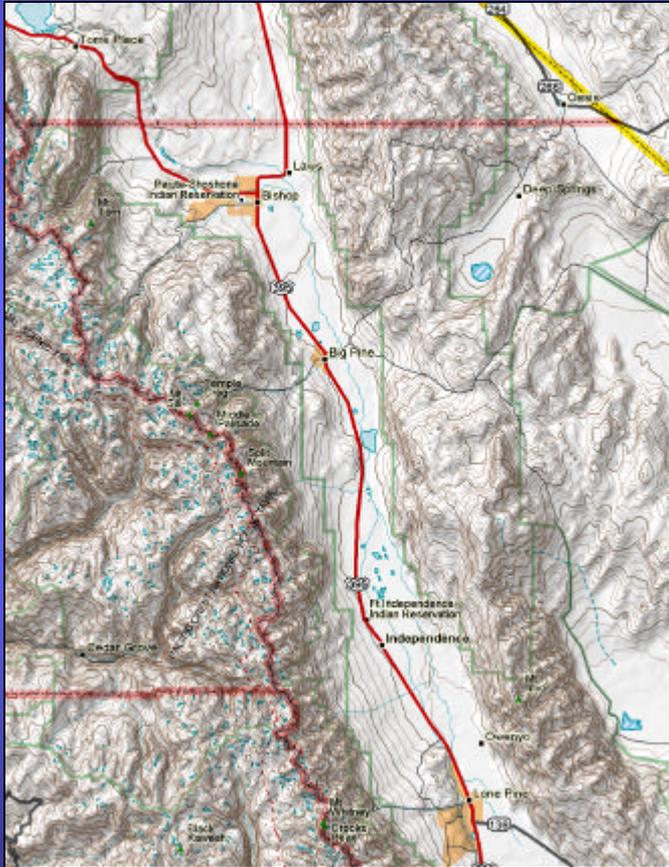
INGREDIENTS

- Executive Summary
- Acknowledgements
- Background, Location and History (maps, met data, non-attainment, exceedances)
- Air Quality in Neighboring Jurisdictions
- Impacts of Neighboring Sources
- Source Inventory on the Reservation
- Emission Inventory

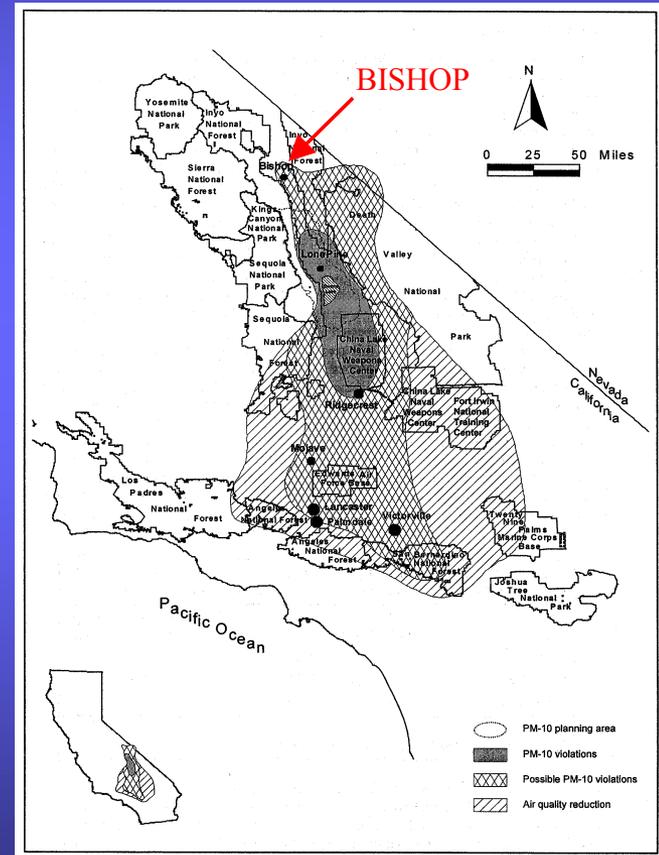
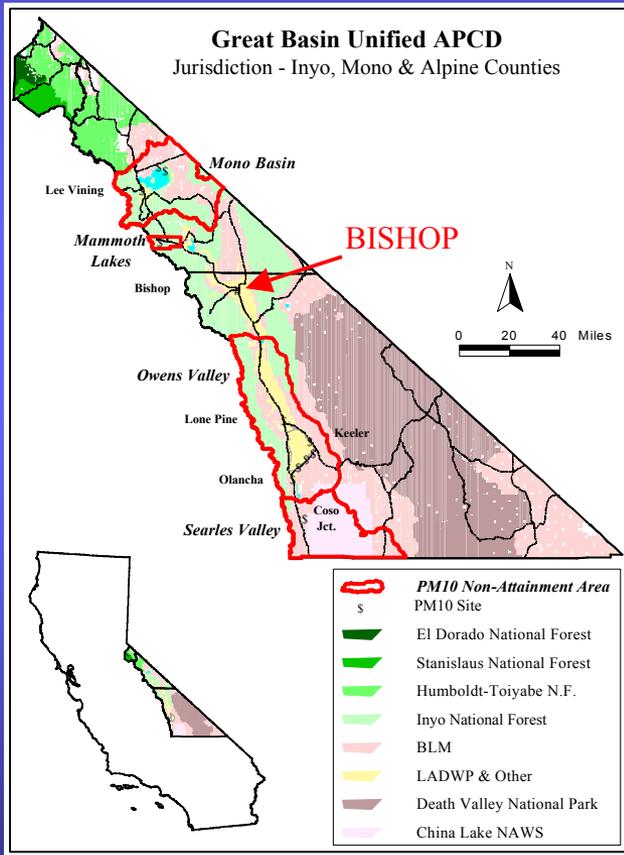
TYPES OF INFORMATION

- Maps
- Weather Information
- Websites for Air Quality
 - ✓ US EPA
 - ✓ State of California
 - ✓ IMPROVE
- Data from Local Air Districts
 - ✓ Reports
 - ✓ Monitoring Data
 - ✓ Permits
- Identifying On-Reservation Sources
- Collecting Primary Data
- Sources of Emission Factors
- Sample Calculations
 - ✓ Data Sources
 - ✓ Calculations
- Summarizing Results

LOCATION MAPS



AIR QUALITY MAPS



WEATHER DATA

SOURCES

- The Weather Channel

www.weather.com

- National Climatic Data Center

www.ncdc.noaa.gov

Table 1. Meteorological Data for Bishop Airport Weather Station, 1948-2001

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Overall
Temperature													
Average High (deg. F)	53	58	63	71	80	90	97	94	86	76	62	53	74
Average Low (deg. F)	22	26	30	35	43	51	56	54	46	37	27	21	39
Mean (deg. F)	38	42	47	53	62	71	77	75	67	57	45	38	58
Record High (deg F.)	76	81	87	93	101	109	109	107	112	97	84	78	112
Year	1998	1986	1966	1989	1951	1954	1972	1993	1995	1980	1988	1958	
Record Low (deg. F)	-7	-2	9	15	25	29	34	37	26	16	5	-8	-8
Year	1974	1969	1971	1953	1964	1988	1987	1959	1948	1970	1958	1990	
Precipitation													
Average (Inches)	1.1	1.0	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.6	0.8	5.4

Source: National Climatological Data Center as reported on www.weather.com, 7/15/2002.

AIR QUALITY WEBSITES

- US EPA

www.epa.gov/air/data

- State of California

www.arb.ca.gov

- IMPROVE

vista.cira.colostate.edu/improve

US EPA

Reports		Maps
Air Monitoring Criteria Air Pollutants		
Monitor Values	Monitor Address	Monitor Locator
Monitor Trends	Monitor Count	Facility/Monitor Locator
Monitor Summary	Monitor PSI	PSI Chart
Emissions Criteria Air Pollutants		
Facility Emissions	Tier	Facility Locator
Facility Count	Facility Search	Facility/Monitor Locator
Facility SIC		Emissions Summary
Emissions Hazardous Air Pollutants		
Facility Emissions	Facility MACT	
Facility Count	Facility Summary	

SAMPLE EPA DATA FOR INYO COUNTY

Table 2. Inyo County Summary Data for Exceedances of Federal Standards

Year	Ozone (PPM) 2 nd Max 24-hr	PM-10 (mg/m ³) 2 nd Max 24-hr	PM-10 (mg/m ³) Annual Mean
2001	0.092	12,160	267.7

Source: US EPA AIRData, Monitor Summary Report, 2001.

Death Valley

Transport from the
San Joaquin Air
Basin

Owens Dry Lake

Largest Source of PM-
10 in the nation

STATE OF CALIFORNIA

- Emission Inventory Data
- Air Toxics Inventory
- Mobile Source Emission Inventory
- PM and Ammonia Inventory

Statewide	Tabular Emissions by Major Source Category
Air Basin	Map of Air Basins with Links to Tabular Data List of Air Basins with Links to Tabular Data
County	Map of Counties with Links to Tabular Data List of Counties with Links to Tabular Data
Custom	Create a Customized Summary Inventory Data Report (select year, major source category and geographic area)
Facility Search	Search for Facility Data (select year, geographic area and facility ID)
Custom	Create a Customized Summary Forecast Inventory Report (select year, major source category and geographic area)

SAMPLE ARB DATA FOR INYO COUNTY

Table 3. Inyo County 2001 Estimated Annual Emissions in Tons per Day

Category Name	TOG	ROG	CO	NOX	SOX	PM	PM-10
Fuel Combustion	0.01	0.01	0.03	0.69	0.56	0.08	0.06
Waste Disposal				0.00		0.00	0.00
Cleaning and Surface Coatings	0.24	0.20					
Petroleum Production and Marketing	0.06	0.06					
Industrial Processes			0.00	0.03	0.03	1.29	0.59
Subtotal Stationary Sources	0.30	0.26	0.04	0.71	0.59	1.37	0.65
Solvent Evaporation	1.41	1.38					
Miscellaneous Processes*	0.75	0.33	4.53	0.10	0.01	1,642.69	825.79
Subtotal Area-Wide Sources	2.16	1.71	4.53	0.10	0.01	1,642.69	825.79
On-Road Motor Vehicles	2.02	1.88	16.52	1.96	0.01	0.04	0.04
Other Mobile Sources	0.48	0.45	2.40	0.54	0.06	0.04	0.04
Subtotal Mobile Sources	2.50	2.33	18.91	2.50	0.07	0.08	0.08
Subtotal Natural Sources**	0.12	0.07	1.90	0.09		0.39	0.37
TOTAL	5.08	4.37	25.38	3.40	0.67	1,644.63	826.90

NOTES: * Primary source of area-wide air pollution is fugitive windblown dust (mainly from the Owens Dry Lake).

** Primary natural source of air pollution is wildfires.

DEFINITIONS: TOG: total organic gasses; ROG: reactive organic gasses; CO: carbon monoxide; NOX: nitrogen oxides; SOX: sulfur oxides; PM: particulate matter; PM-10: particulate matter less than 10 microns in diameter

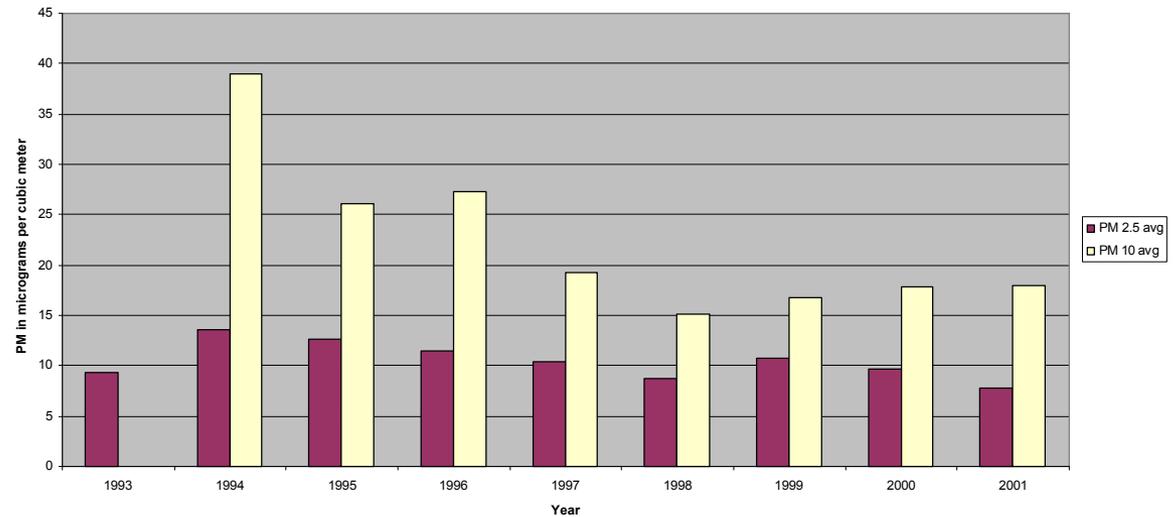
SOURCE: California Air Resources Board website, www.arb.ca.gov 4/17/02.

IMPROVE

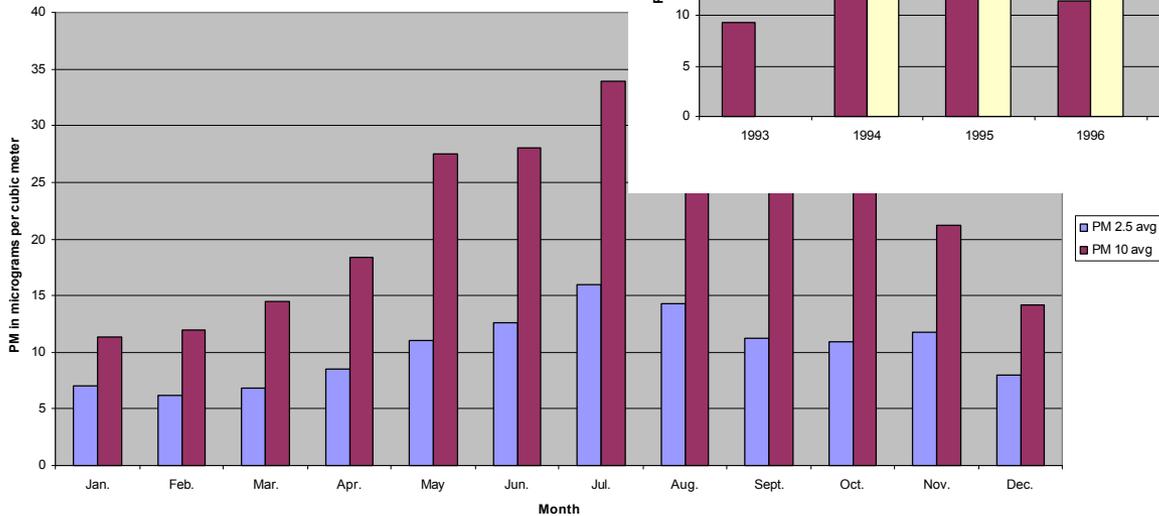
- Graphic Viewer
 - IMPROVE Summary Data
 - Aerosol Data ASCII Files
 - Online IMPROVE Database Access
 - Optical Data
 - Photographs
 - Monthly Relative Humidity and RH Correction Factors
- Network Selection (which Park)
 - Data Selection (month, year, particle)
 - Output Options (screen or file, wide or skinny columns, delimiter, date format)
-

SAMPLE IMPROVE DATA FOR SEQUOIA NATL. PARK

Yearly Average Particulate Matter, Sequoia National Park



Monthly Particulate Matter, Seq



DATA FROM AIR DISTRICTS

- Reports
 - ✓ Air Quality Management Plans
 - ✓ State Implementation Plans

Either or both may contain useful emission inventories
- Monitoring data from nearby sites

SAMPLE PM-10 DATA

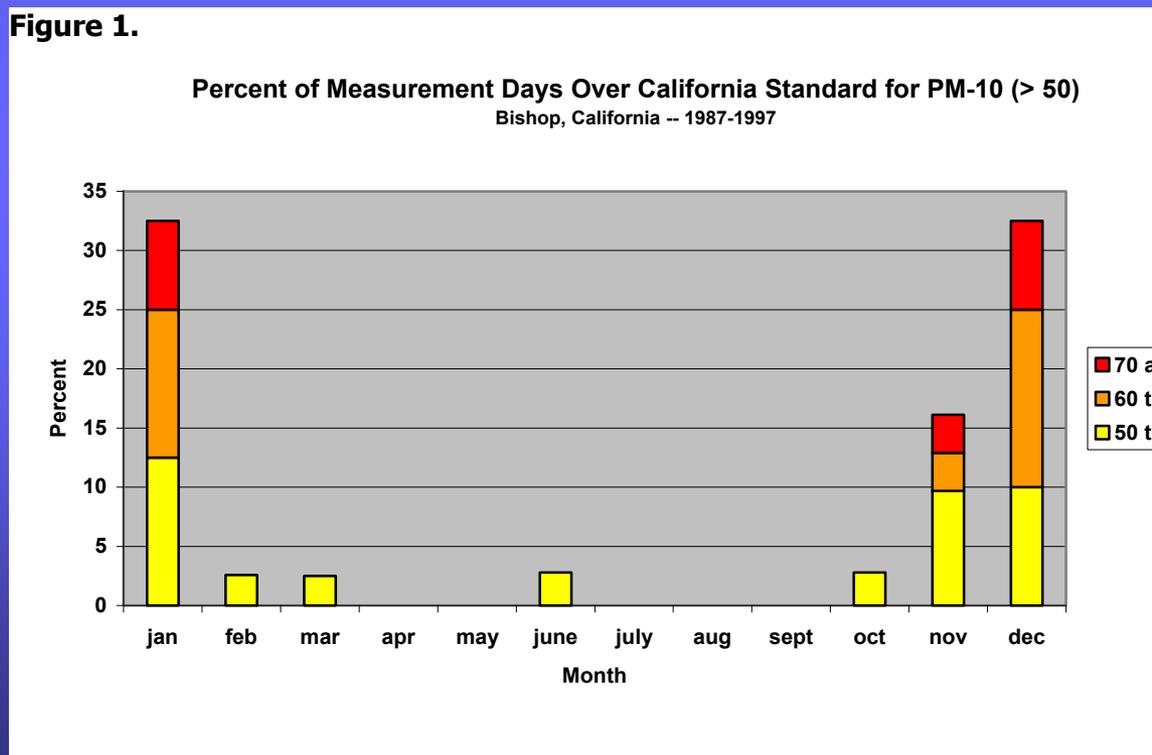
Table 5. Percent Distribution of 24-Hour PM-10 Values, Bishop 1987-1997

M-10	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 and over
Percent	3%	40%	33%	12%	4%	4%	3%	2%

NOTE: Federal Standard is $150 \mu\text{g} / \text{m}^3$ and state standard is $50 \mu\text{g} / \text{m}^3$.

SOURCE: Great Basin Air Pollution Control District, data archives.

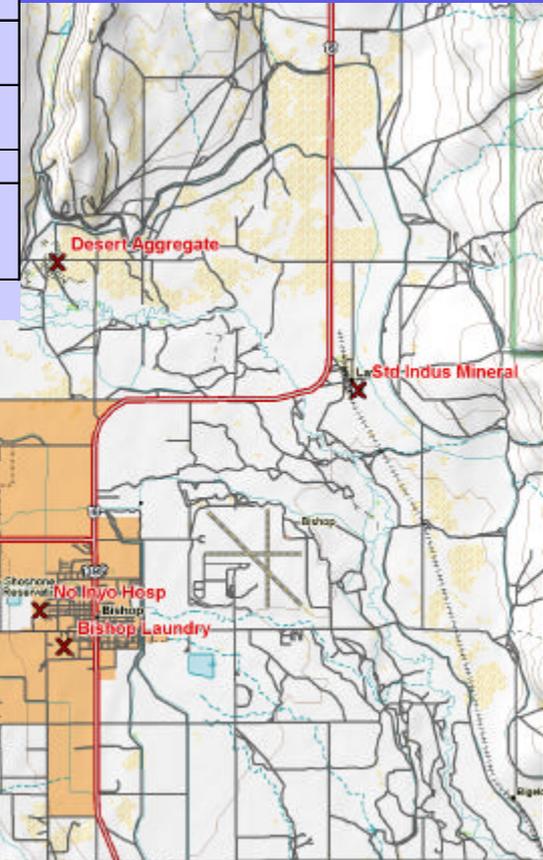
Figure 1.



PERMIT DATA

Table 7. Permit Information from the Great Basin Unified Air Pollution Control District.

Facility	Year	CO	NOX	SOX	PM	PM-10
Bishop Laundry / Linen	1999	0.3 tons/yr	3.6 tons/yr	8.2 tons/yr	0.1 tons/yr	0.6 tons/yr
Desert Aggregates	1999		6 tons/yr	9 tons/yr	94.8 tons/yr	26.5 tons/yr
Hiatt Sand and Gravel	1999				10.1 tons/yr	5.1 tons/yr
N. Inyo Hospital	1999		0.3 tons/yr		0.8 tons/yr	0.2 tons/yr
Standard Industrial Mineral	1999		1 ton/yr		17 tons/yr	7.4 tons/yr



ON-RESERVATION SOURCES

- Emissions from residential trash burning
 - DIOXIN, PM, NOXIOUS ODORS
- Smoke for residential wood burning for home heating
 - PM
- Emissions from vegetative waste burning
 - PM
- Fugitive dust from dirt roads
 - PM
- Fugitive dust from paved roads
 - PM
- Vehicle emissions
 - TOG, ROG, CO, NOX, SOX, PM

PRIMARY DATA

- Surveys
 - ✓ Chimney Sweep Project (wood burning)
 - ✓ General Household Survey (wood burning, backyard trash burning)
- Utility Data
 - ✓ Number of households (residences with water and sewer hook-ups)
- Traffic Surveys
 - ✓ Inyo County Public Works

EMISSION FACTORS

- US EPA – AP-42
- State and local reports
 - ✓ SIPs (Owens Dry Lake)
 - ✓ Air Quality Plans (City of Mammoth Lakes)
 - ✓ CARB (backyard trash burning)

SAMPLE CALCULATION

WOOD SMOKE (Standard Stove)

DATA

- 570 households
- 78% heat with wood, of these 68% have a standard stove
- Average household burns 3.14 cords, mostly pine

CONSTANTS

- Mass = # cords x 800 kg/cord
- Emission factor = 15 g / kg
- Emissions = e.f. x mass

CALCULATIONS

- Households heating with wood = $570 \times .78 = 445$
- Heating with standard wood stove = $445 \times .68 = 303$
- PM-10 / standard wood stove = $3.14 \text{ cords} \times 800 \text{ kg/cord} \times 15.0 \text{ g / kg} = 37.68 \text{ kg / stove}$
- PM-10 for all standard stoves = $37.68 \text{ kg / stove} \times 303 = 11,417 \text{ kg / year}$

SUMMARY OF RESULTS

Table 9. PM-10 from On-Reservation Sources

SOURCE	PM-10 (Kg/year)	PM-10 (tons/year)
Residential Trash Burning	1,562	1.72
Smoke from Residential Wood Burning for Home Heating	14,306	15.77
Vegetative Waste	127	0.14
Fugitive Dust from Dirt Roads	4,745	5.23
Entrained Paved Road Dust	3,584	3.95
Other Vehicle PM-10	322	0.35

CONCLUSIONS



- Not complicated or difficult
- Start with information from surrounding jurisdictions
- Develop a regional picture
- Add detailed information for the Reservation

DO YOU NEED A SOURCE AND EMISSION INVENTORY?



Mt. Tom and Basin
on a Clear Day



...During a Dust
Storm



...Disappearing during a
Forest Fire